

BLACKFOOT CHALLENGE

WEEKLY IRRIGATION REPORT

Friday July 27, 2018



Haying continues across the drainage and despite the extra work, most folks are happy with the harvest. Small grains are maturing and spring grains hit their peak crop water use for the year (almost ¼ inch per day). Sunshine and hot temperatures continue to dominate the forecast with little or no rain in sight. If you just cut hay and still have water, apply one or two irrigations as soon as possible to help plants recover. Water use remains high for mature crops (1 ½ - 2 inches per week) but has dropped where hay was just cut and where annual crops are maturing. Long-range forecasts still predict above average temperatures and average rainfall for the rest of the season. Stream flows continue to drop quickly. General irrigation suggestions for the entire season are presented on the last page of this report. Use these to look ahead and plan or to compare with what you're doing now. If you have questions or comment please contact Jennifer Schoonen - Blackfoot River Steward (360-6445) or Barry Dutton – Soil and Irrigation Consultant (240-7798).



WEATHER - CHANCE OF THUNDERSTORMS THEN SUN

There is a chance for thunderstorms and a little rain Friday and Saturday. The rest of the week looks like hot weather and sun again. The 30- and 90- day forecasts still suggest above normal temperatures and normal rainfall for the remainder of the growing season. Remember that 'normal' rainfall means not much for August and September.



CROP WATER USE - ABOVE AVERAGE AGAIN

Crop water use remained above-normal this week due to hot, sunny weather and will continue next week as similar weather continues. Harvest is producing some great crops. Water use for small grains will drop off as crops mature. Water use for hay drops by 2/3 the first week after cutting and by 1/3 the second week then returns to normal levels by the third week. The table and chart on Page 2 summarize the entire irrigation season and compare it with average, hot and cool conditions.



WATER USE IN INCHES	LAST 7 DAYS	NEXT 7 DAYS¹	SEASON TOTAL²
HAY CROPS	1.8	1.8 (1.6 – 1.9)	14.4
PASTURE	1.5	1.5 (1.3 – 1.6)	11.8
SPRING GRAINS	2.0	1.5 (1.4 – 1.6)	12.3
WINTER WHEAT	1.0	0.5 (0.3 – 0.5)	14.8
LAWNS	1.7	1.7 (1.5 – 1.8)	13.7
RAIN (Average across drainage croplands)	T	T	6.2
EFFECTIVE RAIN	0	0	4.8

¹Expected water use (range if weather becomes cooler or hotter than expected)

²Beginning April 1 – note in 2010-13 we started our seasonal total on May 1 but since include April

BLACKFOOT 2018 GROWING SEASON WEEKLY RAINFALL & CROP WATER USE (INCHES OF WATER)

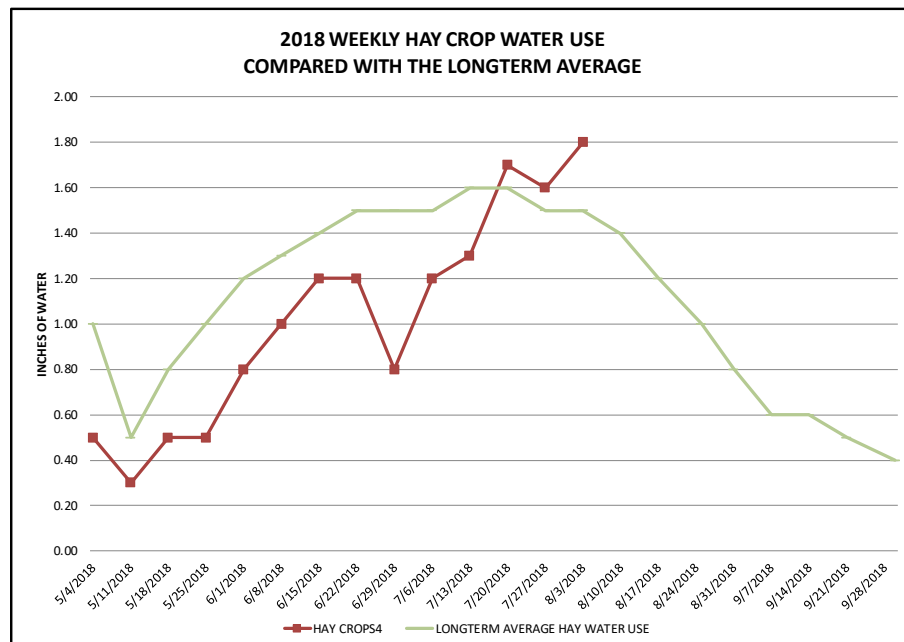
WEEK ENDING	RAIN ¹	2018 WEEKLY POTENTIAL CROP WATER USE ²						AVERAGE POTENTIAL CROP WATER USE ³		
	RAIN	HAY CROPS ⁴	PASTURE	SPRING GRAINS 5-1 START	SPRING GRAINS 5-15 START	WINTER WHEAT	LAWNS	LONGTERM AVERAGE HAY WATER USE	HOT WEEK HAY WATER USE	COOL WEEK HAY WATER USE
APRIL	1.50	0.50	0.40	0.10	0.10	0.50	0.50	1.00	1.50	0.50
5/4/2018	0.50	0.30	0.20	0.10	0.10	0.30	0.30	0.50	0.80	0.30
5/11/2018	0.50	0.50	0.40	0.10	0.10	0.50	0.50	0.80	1.00	0.50
5/18/2018	0.50	0.50	0.40	0.10	0.10	0.50	0.50	1.00	1.10	0.60
5/25/2018	0.25	0.80	0.70	0.30	0.10	0.80	0.80	1.20	1.30	0.80
6/1/2018	0.75	1.00	0.90	0.50	0.30	1.10	1.00	1.30	1.40	0.90
6/8/2018	0.20	1.20	1.00	0.80	0.50	1.30	1.10	1.40	1.50	1.00
6/15/2018	0.50	1.20	1.00	0.90	0.70	1.30	1.10	1.50	1.70	1.00
6/22/2018	1.25	0.80	0.70	0.80	0.60	1.00	0.80	1.50	1.90	1.10
6/29/2018	0.25	1.20	1.00	1.20	0.90	1.30	1.10	1.50	2.00	1.20
7/6/2018	0.01	1.30	1.00	1.50	1.20	1.50	1.20	1.60	2.10	1.30
7/13/2018	0.01	1.70	1.30	2.00	1.80	1.80	1.60	1.60	2.00	1.20
7/20/2018	0.01	1.60	1.30	1.90	1.90	1.90	1.50	1.50	2.00	1.20
7/27/2018	0.01	1.80	1.50	2.00	2.00	1.00	1.70	1.50	2.20	1.10
8/3/2018								1.40	1.70	1.00
8/10/2018								1.20	1.50	0.90
8/17/2018								1.00	1.30	0.70
8/25/2018								0.80	1.00	0.50
8/31/2018								0.60	0.80	0.40
9/7/2018								0.60	0.70	0.30
9/14/2018								0.50	0.70	0.30
9/21/2018								0.40	0.60	0.20
9/30/2018								0.40	0.60	0.20
TOTAL	6.24	14.40	11.80	12.30	10.40	14.80	13.70	24.80	31.40	17.20

¹ Rainfall should be reduced to account for immediate evaporation from crop and soil surfaces (0.1-April, May and Sept, 0.15-June and August, 0.2-July)

² **This years** maximum water use by healthy crops that are well-fertilized and irrigated, disease and insect-free. Will vary slightly across the drainage.

³ **Longterm average** water use for each crop each week based on long-term historic data.

⁴ Hay Crop water use drops approximately 2/3 the first week after cutting, 1/2 the second and 1/3 the third.





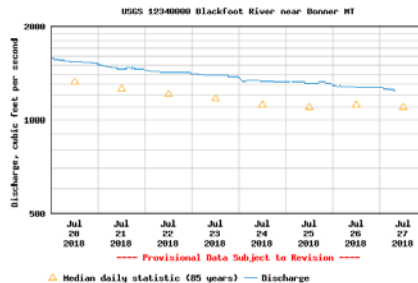
SOIL MOISTURE - RECHARGE AFTER CUTTING

Soils will now dry out fast after irrigation and more water is lost to evaporation before it can reach the soil and crop. Warm, sunny conditions and a little wind produce the highest crop water use and a challenge to boosting soil moisture. To boost soil moisture you now need to apply enough water to satisfy the crop water use (1-2 inches for mature crops) PLUS enough to account for evaporation before it reaches the soil (.25 – .50 inch) PLUS the amount you want to add to the soil (3-6 inches to fill it up). One advantage to irrigating after hay cutting is that the crop uses less water for about two weeks so it's easier to recharge soil moisture. There is also less crop to intercept irrigation and evaporate it before it gets to the soil. It's ideal to keep your soil moisture above 50% of water holding capacity for best production. At 50% of water holding capacity the soil can be formed into a ball (top photo). The hand gets dirty and appears moist (bottom photo) but not shiny wet. Call if you have questions about your soil moisture or visit the irrigation guide on the Challenge website.

WEEKLY TIPS

Streamflows and Drought (or the new normal)

Blackfoot river flows continued the typical slow summer decline this week to about 1,240 CFS at Bonner which is near average (1,140 CFS). The highest level recorded for this date was 3,050 (1899) and the lowest 435 (1988). The steady decline will continue with the hot weather predicted this week. It seems that now, even in the “best” of years, we may be at risk of late-season drought as the new normal.



Montana Water Law - Good for Irrigators and Our Water Future

There is a lot of talk these against regulations and sometimes this gets extended to Montana water law. Those who have gone through the long, expensive process of having their water rights confirmed or adjudicated often are frustrated as well as poorer. But without regulation we have chaos, uncertainty and potential disaster. Without air quality regulations we had air that killed us, even here in Montana. Without water quality regulations rivers caught on fire and fish were scarce. People across the west are finding out that without good water rights regulation, their water future is subject to greed theft and doom.

In Montana we give out water for specific uses like irrigation based on availability and need with protections for those who were here first (first in time - first in right). However, elsewhere across the west there are no requirements to prove water is available, supplies will not be exhausted or that the earlier rights will be protected. Instead of first in time - first in right, these areas are ruled by the “law of the biggest pump”. Anyone can file for a groundwater well permit and pump as much as they like.

Arizona Example

One example of bad water law that doesn't protect water resources or irrigators is in Arizona, a state that has spurned water regulation. Large corporations have spent huge sums to develop Arizona irrigation based on ancient groundwater reserves. These aquifers were mainly filled during wetter times in the remote geologic past and are not adequately recharged by current rainfall. Industrial-scale irrigators have developed huge acreages and installed deep wells. These lowered water tables below where existing farms, towns and residents can reach. Some water levels have dropped up to 300 feet in 35 years.

Nut growers have become a special problem due to high foreign demand and huge profits. While most Blackfoot irrigators apply 1-2 feet of water to local crops, nut trees use 2 feet during establishment and 6 feet when mature.

Foreign involvement has increased the controversy. Middle eastern countries who already exhausted (mined) their own groundwater reserves have focused on US states with poor water laws like Arizona. Saudi Arabia and the United Arab Emirates purchased and developed over 10,000 acres to grow alfalfa and ship back home for their livestock. A similar controversy has been brewing for years on the lower Colorado river with alfalfa grown using limited US/Mexica water and then shipped to China. These groups have almost limitless resources to overcome local opposition where good water regulations don't exist. Local irrigators and homeowners don't stand a chance.

In Arizona, the resource is not protected so water can be "mined" in get-rich-quick schemes that remove the water with no concern for the future. Water mining occurs where more water is removed by pumping than is replenished by rainfall. Some of this water took thousands of years to accumulate in aquifers but can be exhausted in a few short years or decades leaving a desert. Another impact of water mining is that land subsidence has become widespread sinking more than 15 feet in places and opening up 50 miles of earth fissures. For more on this subject in Arizona see: <https://www.nytimes.com/2018/07/19/magazine/the-water-wars-of-arizona.html> .

California Example

California is another state with little or no historic groundwater regulation. Regulations have recently passed but most don't take effect for 20 years which is too late for most concerns. You would think that the driest states like Arizona and California would have the most robust regulations and controls but many of the strangest stories still originate here. A recent film – *Water and Power: A California Heist* – details how one of the largest fortunes in America was created by manipulating water regulations. These folks essentially stole public water and dried up the supply for locals while making millions. Land is subsiding at rates over a foot per year. This film is available on NETFLIX. I can't help comparing this with the Snake River aquifer in Idaho. Although Idaho is not famous for aggressive natural resource regulation, they have done a good job of regulating this aquifer to ensure it is a sustainable resource forever. Those with the biggest pumps cannot take it all quickly.

Water and Irrigation

Water and irrigation has a fascinating history in the world, the western US and Montana. The classic book on western irrigation is *Cadillac Desert* by Marc Reisner (also a video available on YouTube). The books *Topsoil and Civilization* and *Dirt* tell how civilizations collapsed due to irrigation interruptions. So if you don't like *regulations*, start thinking of them as *protections* and thank our Montana government that we are protected. We have more control of our water future than most.

For further information contact Jennifer Schoonen, Blackfoot Challenge Water Steward, 406-360-6445 or Barry Dutton, Professional Soil Scientist, 406-240-7798 barry@landandwaterconsulting.net

THE BLACKFOOT DRAINAGE IRRIGATION SEASON IN BRIEF

This is a summary of general activities and recommendations for the whole season (more detail in the irrigation guide).

APRIL – GET READY AND PLAN YOUR IRRIGATION STRATEGY!

- Get your irrigation system ready – perform maintenance and test system.
- Evaluate soil moisture conditions and weather predictions then plan for irrigation and drought if needed.



MAY – CHECK SOIL MOISTURE & BE READY FOR UNUSUAL HEAT OR COLD!

- Check the soil moisture content at the start of growing season and fill up the soil to its water holding capacity during early irrigations (2-4 inches).
- Watch for dry soil conditions, especially with new plantings and apply water to ensure good germination and emergence.
- Irrigate deeply at least once early in the season to promote deep root growth.
- Apply 2-5 inches of irrigation to hay and pasture crops in May depending on weather. Apply 0-2 inches to spring grains and new plantings as needed based on weather and growth. Apply extra water to fill up the soil (2-4 in).

JUNE – THIS IS THE TIME TO MAKE YOUR BIGGEST EFFORT SO POUR IT ON!

- Apply 6-8 inches of irrigation in June to hay and pasture crops and winter wheat depending on weather. Apply 5-8 inches to spring grains and new plantings as needed based on weather and growth.
- Consider irrigating deeply to fill up soil root zone and promote deep root growth.
- Be sure small grains are irrigated well during their critical periods of boot, bloom and early heading.



JULY – POUR IT ON UNTIL HARVEST AND RETURN QUICKLY

- Apply 1 - 2 ½ inches of irrigation per week in July to all crops - depending on weather.
- Cutting is a critical stress period for hay crops, especially alfalfa so irrigate deeply to fill up the root zone before cutting then get back across the field quickly after cutting. Crop water use declines when hay is cut so this is a good opportunity to fill up the soil again. Irrigate at least once after cutting.
- Stop irrigating small grains at the milk to soft dough stage but be sure there are 1- 2 inches of soil moisture left at this stage to prevent kernels from shrinking.

AUGUST- KEEP IRRIGATING SMALL GRAINS UNTIL KERNELS MATURE, BE DROUGHT AWARE!

- Apply 1 - 2 inches of irrigation per week in August to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed.
- Many folks irrigate for pasture following their one hay cutting. Irrigate according to how much pasture you seek and with consideration for other water needs in the drainage, especially in drought years.
- Reduce river withdrawals by rotating systems and reducing the amount of irrigation at one time. Stop irrigating if you can.



SEPTEMBER – APPLY AS NEEDED/AVAILABLE & GET READY FOR SPRING!

- Apply ½ - 1 ½ inches of irrigation per week in September to hay and pasture crops for full production depending on weather. Irrigate new plantings as needed. Prepare the system for winter and an early start next spring.